B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE

(In line with Oklahoma University)

Second Year, III Semester

MATH- Mathematics III										
Teaching Scheme					**Exam Scheme**					
L	**T**	**P**	**C**	**Hrs/Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
3	1	0	4	4	30	60	10	--	--	**100**

UNIT I **Hours: 10**

Introduction of Some Special Functions: Gamma function, Beta function, Bessel function, Error function and complementary Error function, Heaviside's function, pulse unit height and duration function, Sinusoidal Pulse function, Rectangle function, Gate function, Dirac's Delta function, Signum function, Saw tooth wave function, Triangular wave function, Half wave rectified sinusoidal function, Full rectified sine wave, Square wave function.

Ordinary Differential Equations and Applications: **First order differential equations**: Basic concepts, Geometric meaning of y' = f(x,y) Direction fields, Exact differential equations, Integrating factor, Linear differential Equations and non linear Differential Equation (Bernoulli equations,) .

UNIT II **Hours: 10**

Linear differential equations of second and higher order: Homogeneous linear differential equations of second order, Modeling: Free Oscillations, Euler- Cauchy Equations, Wronskian, Non homogeneous equations, Solution by undetermined coefficients, Solution by variation of parameters, Higher order linear differential equations, Higher order homogeneous with constant coefficient, Higher order non homogeneous equations.

Partial Differential Equations: Formation PDEs, Solution of Partial Differential equations f(x,y,z,p,q) = 0, Nonlinear PDEs first order, Some standard forms of nonlinear PDE, Linear PDEs with constant coefficients, Equations reducible to Homogeneous linear form, Classification of second order linear PDEs

UNIT III **Hours: 10**

Fourier Series and Fourier Integral: Periodic function, Trigonometric series, Fourier series, Functions of any period, Even and odd functions, Half-range Expansion, Fourier integral.

Application of Partial Differential Equations: Separation of variables use of Fourier series, D'Alembert's solution of the wave equation, Heat equation: Solution by Fourier series and Fourier integral

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UNIT IV

Hours: 12

Power Series: Series Solution of Differential Equations: Power series method, Theory of power series methods, Frobenius method.

Laplace Transforms and Applications: Definition of the Laplace transform, Inverse Laplace transform, Linearity, Shifting theorem, Transforms of derivatives and integrals Differential equations, Unit step function Second shifting theorem, Dirac's delta function, Differentiation and integration of transforms, Convolution and integral equations, Partial fraction differential equations, Systems of differential equations

Total Hours: 42

Textbook:

1. Higher Engineering Mathematics, by B. S Grewal, Khanna Publication, Delhi

Reference Books:

1. Higher Engineering Mathematics Vol. 1 by Dr. K.R.Kachot, Mahajan Publishing House
2. Higher Engineering Mathematics Vol. 2 by Dr. K.R.Kachot, Mahajan Publishing House
3. Advanced Engineering Mathematics (8th Edition), by E. Kreyszig, Wiley-India (2007).
4. Engineering Mathematics Vol 2, by Baburam, Pearson
5. Elementary Differential Equations (8th Edition), by W. E. Boyce and R. DiPrima, John Wiley (2005)
6. Fourier series and boundary value problems (7th Edition), by R. V. Churchill and J. W. Brown, McGraw-Hill (2006).
7. T.M.Apostol, Calculus , Volume-2 (2nd Edition), Wiley Eastern , 1980
8. Engineering Mathematics, by Kreyszig E,Wiley Eastern Ltd.

B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE

(In line with Oklahoma University)

Second Year, III Semester

MATH-Differential and Integral Calculus III (MATH 2934)										
Teaching Scheme					**Examination Scheme**					
L	**T**	**P**	**C**	**Hrs/Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
4	-	-	4	4	--	--	--	--	--	**100**

Vectors and vector functions, functions of several variables, partial differentiation and gradients, multiple integration, line and surface integrals, Green-Stokes-Gauss theorems.

PHYS - General Physics II (PHYS 2524)										
Teaching Scheme					**Examination Scheme**					
L	**T**	**P**	**C**	**Hrs/Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
4	-	-	4	4	--	--	--	--	--	**100**

Temperature, heat, thermodynamics, electricity, magnetism, optics

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B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE

(In line with Oklahoma University)

Second Year, III Semester

GEOL - Earth Science										
Teaching Scheme					**Examination Scheme**					
L	**T**	**P**	**C**	**Hrs/Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
3	1	0	4	4	30	60	10	--	--	**100**

Unit I : Earth, Mineralogy and Crystallography **Hours: 10**

Origin of Earth , Age of Earth, Internal Structure and Constitution of Earth, Mineralogy, Crystallography of Minerals; Physical, Optical and Chemical properties of minerals; origin and occurrence of minerals

Unit II : Petrology and Physical Geology **Hours: 10**

Petrology: Igneous, Sedimentary and metamorphic rocks with respect to their origin mode of occurrence texture and structures. Classification of rocks, Physical Geology: Weathering and erosion, transporting agents, geological work of wind, river, subsurface water, lakes, volcanoes, glaciers, earthquakes, ocean and seas. Depositional environments, Concepts of Isostacy

Unit III : Structural Geology **Hours: 10**

Structural Geology-Bedding plane, dip and strike, folds, faults, joints and fracture-classification

Unit IV : Paleontology, Stratigraphy and Plate Tectonics **Hours: 12**

Paleontology – Mode of preservation of fossils, uses of fossils, standard geological time scale, Startigraphy - Startigraphic sequences of major petroliferous basins of India Plate Tectonics: formation of continents, convergent and divergent plate boundaries, Island Arc system, Ring of Fire

Total Hours: 42

Texts and References:

1. P. K. Mukherjee, A Text Book of Geology, The World Press Pvt Ltd., Kolkata,
2. Rutley, A Text Book of Mineralogy
3. Supriya Mohan Sengupta, An Introduction to Sedimentary Geology
4. Anthony R. Philpotts and Jay J. Ague, Principles of Igneous and Metamorphic Petrology, Cambridge University Press.
5. Thornbury, Principles of Geomorphology

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B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE

(In line with Oklahoma University)

Second Year, III Semester

GEOL – Physical Geology(GEOL-1114)										
Teaching Scheme					**Examination Scheme**					
L	**T**	**P**	**C**	**Hrs/Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
4	-	-	4	4	--	--	--	--	--	**100**

Plate tectonics, the makeup of continents and mountain building. Heat flow, magnetism, gravity, rock deformation, earthquakes and the earth's interior. Surface processes including weathering, erosion, transport and deposition. Landforms, rivers, groundwater, glaciers, ocean processes, and volcanoes. Minerals and rocks. Application of geology to land-use, groundwater, mineral and fossil fuel exploration.

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B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE

(In line with Oklahoma University)

Second Year, III Semester

PE-Statics & Dynamics										
Teaching Scheme					**Examination Scheme**					
L	**T**	**P**	**C**	**Hrs/Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
3	0	0	3	3	30	60	10	--	--	**100**

Unit I **Hours 10**

Introduction: Scalar and Vector Quantities, composition and resolution of vectors, system of units, definition of space, time, particle, rigid body, force. Fundamentals of Statics: Principles of statics, coplanar, concurrent and non-concurrent, parallel and non-parallel forces, composition and resolution of forces, moments & couples - their properties, combination of coplanar couples and forces, equilibrant, equilibrium, free body diagrams, analytical conditions of equilibrium for coplanar force systems.

Unit II **Hours 09**

Truss: Simple determinate plane trusses and analysis for member forces using methods of joints and methods of sections. Distributed forces, center of gravity and moment of inertia: Center of gravity of lines, plane areas, volumes and bodies, Pappus – Goldinus theorems, moment of inertia, polar moment of inertia & radius of gyration of areas, parallel & perpendicular axes theorems.

Unit III **Hours 10**

Friction: Theory of friction, static and sliding friction, laws of friction, angle and coefficient of friction, inclined plane friction, ladder friction, wedges, belt and rope friction. Simple Machines: Velocity ratio, mechanical advantage, efficiency, reversibility of machines, simple machines such as levers, pulley and pulley blocks, wheel and differential axle, Single purchase/double purchase crab, compound screw jacks.

Unit IV **Hours 10**

Simple stresses & strains: Elastic, homogeneous, isotropic materials; limits of elasticity and proportionality, yield limit, ultimate strength, strain hardening, section of composite materials, prismatic and non-prismatic sections. Strains: Linear, shear, lateral, thermal and volumetric, Poisson's ratio. Stresses: Normal stresses, axial – tensile & compressive, shear and complementary shear, thermal and hoop, Applications to composite material stepped & tapered bars.

Total Hours: 39

REFERENCE BOOKS

1. Engineering Mechanics (Statics) Beer and Johnston, TMH 2005, N.D.
2. Engineering Mechanics: Jaget Babu
3. Engineering Mechanics Statics and Dynamics: R.C.Hibler, Ashok Gupta
4. Applied Mechanics S. B. Junnarkar & H. J. Shah, Charotar Publishing House, Anand
5. Mechanics of Structure Vol. I S. B. Junnarkar & H. J. Shah, Charotar Publishing House, Anand

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B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE

(In line with Oklahoma University)

Second Year, III Semester

PE – Statics and Dynamics(PE-2113)										
Teaching Scheme					**Examination Scheme**					
L	**T**	**P**	**C**	**Hrs/Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
4	-	-	4	4	--	--	--	--	--	**100**

Vector representations of forces and moments; general three-dimensional theorems of statics and dynamics; centroids and moments of area and inertia. Free-body diagrams, equilibrium of a particle and of rigid bodies, principles of work and energy; principle of impulse-momentum. Motion of particles and rigid bodies of translating and rotating reference frames. Newton's laws of motion and Lagrange's equation, including application to lumped-parameter systems. Analyses of trusses, frames, and machines.

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